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| [TOC](#) | [Preface](#) | [Chapter1](#) | [Chapter2](#) | [Chapter3](#) | [Chapter4](#) | [Chapter5](#) |
[Chapter6](#) | [Chapter7](#) | [Chapter8](#) | [Chapter9](#) | [Chapter10](#) | [Chapter11](#) |
[Chapter12](#) | [Chapter13](#) | [AppendixA](#) | [AppendixB](#) | [AppendixC](#) | [AppendixD](#) |
[AppendixE](#) | [AppendixF](#) | [AppendixG](#) | [AppendixH](#) | [AppendixI](#) | [AppendixJ](#) |
[AppendixK](#) | [ALL](#) |

Chapter 3. Research and Program Support Operations

This chapter applies to NASA-piloted aircraft used for research and program support operations.

3.1 Operations

3.1.1 Flight Authorization

3.1.1.1 Center's Chiefs of Flight Operations shall establish procedures to ensure that all flights of NASA aircraft are properly approved and documented, allowing for all contingencies such as deployed aircraft and aircraft ferry approvals. [175]

3.1.1.2 Emergency lifesaving, humanitarian operations, and Homeland Security missions, as pre-approved by the Center Director, may be carried out in any NASA aircraft designated. The circumstances shall be documented and reported to the Assistant Administrator for the Office of Strategic Infrastructure within 30 days of action.[176]

3.1.2 Stabilized Approach

3.1.2.1 All NASA aircraft operations shall establish applicable stabilized-approach criteria suited to their particular flight operation. [177] The optimum stabilized approach is defined as a flight on the glide path (visual or electronic) at a steady rate of descent, on the target approach speed, in the landing configuration, in trim, and with the proper

thrust/torque setting. The dynamics of flight often dictate that flight parameters will vary from the optimum.

3.1.2.2 In the absence of flight manual or aircraft directive guidance, a stabilized approach shall be established by minimum descent altitude or 100 feet above precision minimums in instrument meteorological conditions (IMC), by 500 feet above airport elevation in visual meteorological conditions (VMC), and by 300 feet above airport elevation for a circling approach or overhead patterns. [178]

3.1.2.3 In the event that a stabilized approach is not established by the altitudes required in paragraph 3.1.2.2, a missed approach shall be executed. [179]

3.1.3 TCAS and TAWS Systems

3.1.3.1 Inherent to flying aircraft, there are two specific risks while conducting aircraft operations: midair collisions and controlled flight into terrain (CFIT). Industry and the Government are continually looking at ways to control these two specific risks through avionics improvements and Federal regulations. As part of the Agency's continuous risk management process, all NASA flight operations shall manage these risks in accordance with the specific provisions of this NPR and NPR 8000.4, Agency Risk Management Procedural Requirements. [180]

3.1.3.2 All manned NASA aircraft shall be configured with FAA-approved TCAS and TAWS for the specific type model aircraft. [181]

3.1.3.3 As part of the Agency's continuous risk management process, all NASA flight operations shall develop a TCAS/TAWS Risk Management Plan for all manned aircraft in a Center's inventory not configured with these two systems. [182] The plan will identify the RAC associated with these risks, the abatement plan to control these risks, and the funding priority that has been assigned to close these risks. NPR 8715.1, NASA Safety and Health Occupational Safety and Health Programs, and Appendix B. NASA Form 1584-Safety and Health Hazard Abatement Plan, contain guidance for abatement activity.

3.1.3.4 The order of preference for risk controls is: a) engineering (design, material, or substitution), b) administrative (signage/notices, standard operating procedures (SOPs), training, or limiting exposure), and c) Personnel Protective Equipment.

3.1.3.5 The TCAS/TAWS Risk Management Plan will be updated annually.

3.1.3.6 All manned NASA aircraft contracted through commercial vendors shall be configured with FAA-approved TCAS and TAWS systems for the specific type of model aircraft. [183]

3.1.4 All flight deck crew members of large or turbojet aircraft shall communicate through a boom or throat microphones below the transition level/altitude. [184]

3.1.5 Conduct of flight crew training for simulated emergencies, or for abnormal situations with passengers on board, is prohibited.

3.2 Assignment of Pilot in Command of NASA Aircraft

3.2.1 The PIC of a NASA aircraft shall be a designated NASA pilot. [185] Designated NASA pilots are those who perform piloting duties as a part of their official position description, fulfill NASA contract requirements, or fly in accordance with an interagency

agreement, such as a military pilot on loan to NASA. Center's Chiefs of Flight Operations, with the concurrence of the Center Director, may designate as a PIC, on a temporary basis, individuals possessing required aeronautical qualifications to support NASA's requirements.

3.2.2 The PIC of a NASA aircraft is responsible, at all times, for the safe operation of the aircraft and the safety of its occupants and is the final authority as to whether a flight will occur. The PIC is the final authority as to whether a flight will be delayed or diverted for reasons of weather, aircraft conditions, or other safety-related considerations.

3.2.3 The PIC of a NASA aircraft shall ensure that the crew is briefed on the mission plan, safety procedures, and emergency information, including emergency egress. [186]

3.2.4 Center's Chiefs of Flight Operations shall have a process to train, designate, and document individuals authorized to pilot Functional Check Flight operations. [187]

3.2.5 All NASA PICs shall be trained on the operating rules and procedures of the FAA FARs and the ICAO Rules of the Air when operating in international airspace. [188]

3.2.6 The duties and responsibilities of the PIC shall be specified in the Center's policy, in accordance with Agency standards of practice. [189]

3.2.7 The PIC of any NASA aircraft entering a foreign country shall be responsible for the custody and care of disembarking passengers and crewmembers from the time they leave the aircraft until they are accepted for examination for entry into a State. [190]

3.2.8 A pilot flying as second-in-command (SIC) on a NASA aircraft, when required, reports to the PIC and will carry out any delegated duties.

3.3 Documentation

3.3.1 All flight crew currency documentation shall be recorded in the NASA standard application, NAMIS. [191]

3.3.2 NASA UAS flight time shall be kept separate from NASA manned aircraft flight time, by type, in NAMIS. [192]

3.3.3 Each Center shall establish a means to document that flight critical information has been passed to all flightcrews. [193]

3.3.4 Records pertaining to NASA's flight activities shall include, at a minimum, the following:

- a. Approval of mission.
- b. Name and duty status of all on board.
- c. Purpose of the flight.
- d. Routing or flight events and takeoff /landing times. [194]

3.4 Flightcrew Requirements and Currency

3.4.1 NASA flightcrews shall be qualified in accordance with written standards set forth in Center-developed criteria. [195]

3.4.1.1 Records of qualification and flight evaluation are required and shall be maintained in aircrew training records. [196]

3.4.1.2 A review of pilot and crew qualifications shall be made prior to flight assignment to ensure that prerequisites for the intended mission are met. [197]

3.4.1.3 The Center's Chief of Flight Operations shall designate the crewmembers for aircraft that are under the Center's purview. [198]

3.4.2 NASA flightcrews will be medically certified using NASA medical qualifications, per Chapter 7.

3.4.3 A comprehensive pilot proficiency program is critical to flight safety for pilots flying research and program support missions. Such programs are specific to the assigned missions and reflect an in-depth evaluation of pilot proficiency and capability. Elements of pilot proficiency programs include the following:

3.4.3.1 Center Flight Operations shall impose sufficient proficiency requirements or flight time/sortie requirements on flightcrews to meet mission needs. [199] Private pilot time shall not be recorded in NAMIS or utilized to meet any proficiency requirements. [200]

3.4.3.2 Each Center shall develop a written flightcrew training plan which, at a minimum, shall meet the following requirements:

a. Annual night flying requirements.

b. Landings in category (fixed-wing/rotorcraft).

c. Six instrument approaches under actual or simulated conditions within 6 calendar months

d. Completing 100 hours of flight time, per fiscal year, in any aircraft or flight simulator approved by the Center's Chief of Flight Operations, or 80 hours of flight time and 100 sorties if all are flown in the same model, design, and series of aircraft or flight simulator. [201]

3.4.3.3 Center directives shall establish separate aircrew qualification and currency requirements for unique aircraft (e.g., project, military, experimental) in which the aircrew cannot meet the above requirements. [202].

3.4.3.4 Lapse in Qualification. Crewmembers overdue the annual flight time requirement are disqualified for assignment as PIC or SIC. The Center's Chief of Flight Operations shall document the method to regain qualification in the flightcrew training plan and notify the Assistant Administrator for the Office of Strategic Infrastructure, via HQ AD, of this action in a letter from the Center's Director. [203] At a minimum, it will include a dedicated training flight or training in a simulator and a formal flight evaluation by an instructor pilot prior to further mission assignments. The Center's Chief of Flight Operations shall establish requalification procedures for pilots not meeting any of the remaining requirements above. [204]

3.4.4 Flight proficiency shall be evaluated at least annually by a NASA or NASA-designated pilot, who is an instructor or examiner pilot, in the aircraft used for the evaluation. [205] When available, a suitable simulator, or its equivalent, may be used for this purpose at the discretion of the Center's Chief of Flight Operations. Evaluations conducted by 14 C.F.R § 142, Training Centers, also may be used to satisfy pilot annual evaluations, at the discretion of the Center's Chief of Flight Operations.

3.4.5 Pilot Instrument Evaluations. Instrument flying proficiency shall be evaluated at least annually using professional aeronautical standards such as FAA Instrument Practical Test Standards. [206] The instrument evaluation may be combined with the annual proficiency evaluation or completed separately. The instrument proficiency check may be accomplished in a simulator approved by the Center's Chief of Flight Operations.

3.4.6 Simulations. Annual flight simulator training in each aircraft category (fixed-wing/rotorcraft) is required, if available. If there is no specific simulator for the aircraft type, a simulator of the same category aircraft should be used. Realistic, mission-oriented scenarios may be used to complement the annual proficiency and instrument check requirements.

3.4.7 Tests. Written tests shall be administered and reviewed annually by a check pilot to ensure current pilot knowledge of air traffic control procedures, aircraft systems, and normal and emergency operating procedures, Agency and local instructions, and other pertinent regulations and procedures. [207] Centers co-located with military organizations who conduct "instrument schools" may substitute such training for the above ATC procedural testing.

3.4.8 Reviews. Pilot annual flight evaluations shall be reviewed by the Center's Chief of Flight Operations. [208]

3.4.9 Guest Pilots/Researchers. Each Center's Chief of Flight Operations shall establish local instructions regarding training and currency requirements that must be met for a guest pilot/researcher. [209]

3.4.10 Media Flights. The Center shall establish policies for flying media representatives. [210]

3.4.11 Flight Engineers shall possess an FAA Flight Engineer Certificate appropriate for the aircraft category or equivalent military certification. [211]

3.4.11.1 Centers shall develop alternate training programs to satisfy this requirement should these personnel not be available. [212]

3.4.12 Qualified non-crewmembers shall be authorized by the Chief of Flight Operations to participate in flight operations to support mission requirements. [213]

3.4.12.1 Qualified non-crewmembers shall be trained and will maintain qualification (in accordance with local Center policies and procedures), which shall include, at a minimum, cabin emergency, egress procedures and medical clearances. [214]

3.4.12.2 Qualified non-crewmembers are not passengers. Their presence on a flight is in direct support of, or associated with, the flight or mission that the flight is supporting. Examples of qualified non-crewmembers include, but are not limited to, media representatives observing the mission, scientists conducting in-flight experiments, and mission managers supporting the mission or flight on the ground.

3.5 Ground Training

Each primary crewmember must receive ground training, as specified in paragraph 4.13, with a refresher training every 12 months for pilots. [215]

3.6 Readiness Reviews

3.6.1 There are two categories of readiness reviews, which may be applied to both piloted aircraft and UASs:

a) Flight Readiness Review (FRR)/Operations Readiness Review (ORR) focuses on flight operational safety.

b) Mission Readiness Review (MRR) focuses on mission operational safety using multiple aircraft and multiple activities to ensure mission success.

3.6.1.1 Program managers shall conduct an MRR when multiple aircraft operations are to be conducted. [216]

3.6.1.2 Prior to conducting an FRR/ORR, each individual aircraft involved in the flight or campaign shall have an approved Certificate of Airworthiness. [217]

3.6.2 Personnel who should attend these reviews include the Safety and Mission Assurance Office, the mission manager and/or Principal Investigator, the Range Safety personnel, the Flight Operations personnel, the ASO, and, in the case of UAS operations, the UAS operator. The Chair of the Center Airworthiness Process Program or a representative shall attend all readiness reviews. [218]

3.6.3 An FRR/ORR reviews the operational requirements for a specific flight or campaign. A supervisory Flight Operations pilot or other Flight Operations supervisory personnel shall chair and approve the FRR/ORR flight authorization. [219] Areas of consideration will include:

- a. Science mission requirements.
- b. Flight operations procedures.
- c. Operational Go/No-Go criteria.
- d. Pilot qualifications, flight operations training, and flight manuals.
- e. UAS operations requirements.
- f. Aircraft configuration.
- g. Aircraft maintenance.
- h. Science payload and operations.
- i. Payload combination.
- j. Status of reviews.
- k. Special weather conditions.
- l. Science functional flight test plan.
- m. Pre-accident and/or incident plan.

3.6.4 An MRR reviews the mission interoperability of multiple aircraft from multiple activities to ensure mission success for a specific flight event or campaign. Activities may be different Centers, other Federal agencies, military services, commercial vendors, or non-NASA aircraft. Prior to conducting an MRR, each aircraft involved in the flight or campaign shall have an approved FRR/ORR. [220]

3.6.4.1 The program/project management of the flight/campaign event shall assign an individual who has authorization to proceed with the flight program to chair and make the MRR evaluation. [221]

3.6.4.2 The focus of this review is to ensure that the Principal Investigators and the flightcrews or UAS operators have made the coordination and arrangements required to maximize operational safety and ensure mission success. The MRR shall consider the following:

- a. Flight experiment and science flight requirements.
- b. Organizational and functional chart.
- c. Payload status.
- d. Flight operations procedures.
- e. Aircraft separation/coordination.
- f. Communication plan.
- g. Inter-Center/interagency communication/coordination plan.
- h. Ground operations procedures dealing with hazardous systems.
- i. Schedule timeline.
- j. Roles and responsibilities.
- k. Science coordination requirements.
- l. Program/Project Mishap Preparedness and Contingency Plan.
- m. Liability coverage.
- n. Deployment.
- o. Logistics.
- p. Public affairs/outreach.
- q. Mission assurance. [222]

3.6.5 Centers, Component Facilities, and contractors that do not have an aircraft operations department and operate NASA aircraft/UASs shall coordinate with an alternate NASA Center aircraft operations department for FRR/ORR and MRR services and support. [223]

| [TOC](#) | [Preface](#) | [Chapter1](#) | [Chapter2](#) | [Chapter3](#) | [Chapter4](#) |
[Chapter5](#) | [Chapter6](#) | [Chapter7](#) | [Chapter8](#) | [Chapter9](#) | [Chapter10](#) |
[Chapter11](#) | [Chapter12](#) | [Chapter13](#) | [AppendixA](#) | [AppendixB](#) |
[AppendixC](#) | [AppendixD](#) | [AppendixE](#) | [AppendixF](#) | [AppendixG](#) |
[AppendixH](#) | [AppendixI](#) | [AppendixJ](#) | [AppendixK](#) | [ALL](#) |

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